

CLAIMS

1.- Image acquisition unit with heating device for monitoring the exterior of a vehicle, wherein it comprises:

- 5        - a casing (1) with a protected interior, a window (2) closed by a transparent element (3) and supporting means (4) for supporting an optical system (5) facing said window (2);  
- image detection means (6) located in said casing (1), facing said optical system (5) and associated with connection means with the exterior, 10 for supplying and/or for signals bidirectional interchange; and  
- heating means for providing thermal energy to said transparent element (3), or to an adjacent zone thereto.

15        2.- Unit, according to claim 1, wherein said heating means comprise at least one electrical heater supplied with direct current from said connection means with the exterior.

3.- Unit, according to claim 2, wherein it comprises control means for controlling the operation of said electrical heater.

20        4.- Unit, according to claim 3, wherein said control means comprise an on/off switch to control the activation time of said supply current of the electrical heater.

5.- Unit, according to claim 4, wherein said on/off switch is associated to a thermostat.

6.- Unit, according to claim 4, wherein said on/off switch is at a vehicle's user disposal.

25        7.- Unit, according to claim 5, wherein said on/off switch is common for at least another heating device of the vehicle, selected from a group including: heating system for a rear window; and heating system for an external rear view mirror.

30        8.- Unit, according to claim 3, wherein said control means comprise a man-machine interface to provide different parameters coming from one or more detectors associated to the image acquisition unit and/or to other parts of the vehicle, and/or from an input device at a vehicle's user disposal, to a central processor of the vehicle, which supports an adapted program to control said

supply current of the electrical heater through time as a function of the result of an analysis and a processing of said parameters.

9.- Unit, according to claim 8, wherein said parameters are selected from a group including the interior temperature of the image acquisition unit casing 5 (1), and the exterior environment temperature.

10.- Unit, according to claim 2, wherein said electrical heater comprises at least one electrical resistance (7, 19) directly applied on said transparent element (3).

11.- Unit, according to claim 10, wherein said electrical resistance (7) has 10 the form of an open ring of resistive ink or paste applied on the internal face of said transparent element (3).

12.- Unit, according to claim 11, wherein connection lines (8) are connected to the ends of said open ring of resistive ink or paste.

13.- Unit, according to claim 11, wherein said resistive ink or paste is not 15 weldable and comprises a layer of conductive ink or paste weldable to at least the ends of said open ring of resistive ink or paste.

14.- Unit, according to claim 13, wherein connection lines (8) are connected to said layer of weldable conductive ink or paste applied on the ends of said open ring of resistive ink or paste.

15.- Unit, according to claim 13, wherein said layer of weldable conductive 20 ink or paste is, furthermore, extended along one or more sections of the open ring of resistive ink or paste, in order to reduce its resistance and, therefore, adjust the heating power to a requested value.

16.- Unit, according to any of the claims from 11 to 15, wherein it 25 comprises a layer of a protective mask material over said resistive ink or paste and/or conductive ink or paste, in order to protect the electrical resistance (7).

17.- Unit, according to claim 10; wherein said electrical resistance has the form of a laminar layer of a resistive transparent material (19) applied on the internal face of said transparent element (3).

18.- Unit, according to claim 17, wherein a pair of electrodes (15) of 30 conductive ink or paste are applied on opposite zones of the resistive material laminar layer, in connection to itself, and connection lines (8) are connected to said electrodes (15).

19.- Unit, according to claim 2, wherein said electrical heater comprises at least one electrical resistance (9, 10) applied in an enclosing way on a zone of the casing (1) adjacent to the transparent element (3).

20.- Unit, according to claim 19, wherein said electrical resistance (9) is applied on an external surface of said zone of the casing (1) adjacent to the transparent element (3).

21.- Unit, according to claim 19, wherein said electrical resistance (10) is applied on an internal surface of said zone of the casing (1) adjacent to the transparent element (3).

10 22.- Unit, according to claim to claim 10, 17 or 19, wherein said electrical resistance (7, 9, 10) consists of a material, the resistance of which increases with the increase of its temperature.

15 23.- Unit, according to claim 10, 17 or 19 wherein said electrical resistance (7, 9, 10) consists of a material, the resistance of which remains substantially constant with the temperature variations of itself.

20 24.- Unit, according to claim 1, wherein said heating means comprise at least one element of a good heat conductive material to transfer heat from a zone of the casing (1), where electronic components of said image detection means (6) are located, to an adjacent zone to the transparent element (3), or close to it.

25. Unit, according to claim 24, wherein said good heat conductive material is the material the casing (1) is made of.

25 26.- Unit, according to claim 1, wherein said heating means comprise a Peltier cell to transfer heat from a zone of the casing (1), where electronic components of said image detection devices (6) are located, to an adjacent zone to the transparent element (3), or close to it.

30 27.- Unit, according to claim 1, wherein said heating means comprise an air expulsion nozzle located near the transparent element (3), and connected to a heating or air conditioning system of a vehicle's compartment, in order to create a warm air barrier in front of the external face of the transparent element (3).